APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/885,375	06/19/2001	Shousheng He	34650-00593	3992

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EXAMINER
MEEK, JACOB M

ART UNIT	PAPER NUMBER
2637	

DATE MAILED: 09/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/885,375	HE, SHOUSHENG
	Examiner	Art Unit	
	Jacob Meek	2637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _05 August 2005_.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1 - 6, 8 - 14, 16, 18, 21_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1 - 5, 8, 9, 11 - 14, 16, 18, 21_ is/are rejected.

7)☒ Claim(s) _6 and 10_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _10 December 2004_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)	5) ☐ Notice of Informal Patent Application (PTO-152)
Paper No(s)/Mail Date _____ .	6) ☐ Other: _____ .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1.   A request for continued examination under 37 CFR 1.114, including the fee set

forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this

application is eligible for continued examination under 37 CFR 1.114, and the fee set

forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action

has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August

5, 2005 has been entered.

Response to Arguments

2.   Applicant's arguments filed 8/5/2005 have been fully considered in section 2 of

remarks but they are not persuasive.

With regard to applicant's argument (section 2) regarding "m+1" and "without matrix

operation", there are two items to be considered.

1) The "m+1" limitation was construed as being equivalent to the 16 symbols as

presented in original claims in conjunction with matrix operation, and was previously rejected.

2) See 112, 1st rejection below, applicant's invention clearly uses a matrix (page 12) and

there cannot claim "without matrix operation." Examiner notes that this limitation was rejected

in 1st office action of independent claims and that no explanation or argument was made with

regard to the patentability of this limitation.

3.   Applicant's arguments, see page 6, filed 8/5/2005, with respect to objection to

claims 1, 11, and 14 have been fully considered and are persuasive. The objection of

claims 1, 11, 14 has been withdrawn.

4.   Applicant's arguments, see page 6, filed 8/5/2005, with respect to rejection of claims 11 and 14 have been fully considered and are persuasive. The rejection of claims 11 and 14 has been withdrawn.

5.   Rejection of the previously rejected claim 1 and dependent claims is maintained, as both Skold and Johanssen show a range of taps that are inclusive of the range claimed by ($1 \leq m \leq 8$) is maintained. The newly added limitation of "near the end" is not considered (see 112, 2nd rejection below) as a meaningful limitation. Also, Skold and Johanssen still read on the range of signals claimed by applicant

6.   Restatement of previous rejections of claim 1, and associated dependent claims.

Office Action Dated, 4/31/05

Claims 4, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Skold (US Patent 5,373,507).

With regard to claim 4, Skold teaches an equalizer with 10 taps (see column 5, lines 9 – 14 where this is interpreted as equivalent).

With regard to claim 16, Skold discloses the step of estimating the transmission channel is performed at different synchronization points (see column 2, lines 3 – 18 where this is interpreted as equivalent).

Claim 1, and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Johansson (US-6,792,052).

With regard to claim 1, Johansson teaches a method of for estimating a transmission channel in a digital communications system which operates in accordance with GSM specifications, communication system including a receiver which receives a signal transmitted over the transmission channel, receiver including a channel estimation–based equalizer, and equalizer having a window size adapted to the

actual delay spread of the transmission channel (see column 1, lines 30 – 63), and equalizer using an estimate of transmission channel for synchronizing and correcting received signal (see column 3, lines 44- 54), received signal including a 26-symbol training sequence (see column 2, lines 5 – 13) said method compromising: using a consecutive m+15 symbols of said 26-symbol training sequence to estimate the transmission channel for different channel spans m (see column 5, lines 38 – 48 where this is interpreted as equivalent).

With regard to claim 16, Johansson teaches a method of estimating the transmission channel is performed at different synchronization points (see column 3, lines 44 – 54 where this is interpreted as equivalent).

Office Action Dated, 9/7/04

Claims 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Skold (US Patent 5,373,507).

With regard to Claim 1, Sköld teaches a method for estimating a transmission channel using any consecutive 16 symbol segment of said 26-symbol training (see Figure 4, CORR) sequence to estimate, without matrix operation, the transmission channel for different equalizer window sizes at different synchronization points (see Figure 3, Column 3 line 31 – Column 4 line 14)

Claims 2 – 5, 9, 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Björk in view of Sköld.

With regard to Claim 2, Sköld teaches the limitations of Claim 1 above and calculation of tap values using 2-dimensional computations (see Column 1, line 50 – Column 3, line 14 and Figure 3). Sköld fails to teach the use of an LSE algorithm. Björk teaches the use of the LSE algorithm (see column 6 lines 45 – 56). Björk's invention provides an improved method for the measuring and compensating for time dispersion (see Summary, 1st paragraph). It would have obvious to one of

ordinary skill in the art to combine Björk's invention with Sköld's invention to produce a receiver of superior performance.

With regard to Claim 3, limitations as taught above in claims 1 and 2. Sköld and Björk teach GSM. EDGE is an enhancement of GSM and would be obvious to one of ordinary skill of the art to incorporate the art of GSM into an EDGE receiver.

With regard to Claim 4, limitations as taught above in claims 1 and 2. Sköld fails equalizer windows spans of 1 – 8 taps. Björk teaches the using of a filter having variable tap lengths (see column 11, lines 18 – 64). Motivation to combine discussed above in Claim 2.

With regard to Claim 5, limitations as taught above in claims 1 and 2. Sköld (Summary of Invention) and Björk (Column 1, lines 40 – 60) teach the use of delayed segments for calculations.

With regard to Claim 9, Sköld teaches the limitations of Claim 1. Sköld fails to teach the use of an LSE algorithm. Björk teaches the use of the LSE algorithm (see column 6, lines 45 – 56). Motivation to combine discussed in Claim 2 above.

With regard to Claim 10, Björk teaches the limitations of Claim 2 above the use of an LSE approach for joint synchronization and equalizer window sizing (See column 7, lines 5 – 14, and column 13, lines 25 - 65).

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7.   Claims 1, 11, and 14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the

invention. These claims recite the limitation "without matrix operation" of which examiner

does not find support for in the specification as use of a matrix is clearly defined.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

8.   The term "near the end" in claim 1 is a relative term which renders the claim

indefinite. The term "near the end" is not defined by the claim, the specification does

not provide a standard for ascertaining the requisite degree, and one of ordinary skill in

the art would not be reasonably apprised of the scope of the invention. The 16- bit

training sequence as defined by GSM standard could arguably be described as near the

end of the 26-bit training sequence. A more explicit definition of this limitation needs to

be provided.

9.   Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite

for failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention. The modified claim does not quantify clearly the symbols that

are preferentially sampled according to applicant's invention.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by
another filed in the United States before the invention by the applicant for patent or (2) a patent
granted on an application for patent by another filed in the United States before the invention by the
applicant for patent, except that an international application filed under the treaty defined in section
351(a) shall have the effects for purposes of this subsection of an application filed in the United States
only if the international application designated the United States and was published under Article 21(2)
of such treaty in the English language.

10.   Claims 1 - 5, 8, 9, 11 - 14, 16, 18, and 21 are rejected under 35 U.S.C. 102(e) as

being anticipated by Yaknich et al (US-6,907,092).

With regard to claim 1, Yaknich discloses a method for estimating a transmission

channel in a digital communications system which operates in accordance with GSM

specifications (see column 7, lines 32 – 40), communications system including a receiver

(see figure 3, 52) which receives a signal transmitted over transmission channel (see figure 3

,32), receiver including a channel estimation-based equalizer (see figure 5, 110, 116),

equalizer having a window size adapted to the actual delay spread of transmission channel

(see column 10, lines 32 – 43), and equalizer using an estimate of transmission channel for

synchronizing and correcting received signal , received signal including a 26-bit training

sequence (see column 11, line 61 – column 12, line 8), method comprising using m +15

consecutive symbols near the end of said 26-symbol training sequence to estimate without

matrix operation (see column 11, line 61 – column 12, line 8), the transmission channel the

transmission channel for different channel spans m, where $1 \leq m \leq 8$ (see column 12, lines 56

– 62 where this is interpreted as inclusive).

With regard to claim 16, Yaknich teaches a method wherein the using step is performed

at different synchronization points (see figure 6 and column 4, lines 46 – 67 where this is

interpreted as equivalent).

With regard to Claim 2, Yaknich teaches calculation of tap values using 2-dimensional

computations using LSE (see Column 10, lines 44 – 60 where this is interpreted as

equivalent).

With regard to claim 3, Yaknich teaches use of GSM (see column 9, lines 31 – 42) of which EDGE is a known derivative.

With regard to claim 4, Yaknich teaches different channel spans m are in the range of 1 – 8 taps (see column 12, lines 56 – 62 where this is interpreted as inclusive).

With regard to claim 5, using step comprises using delayed segments in training sequence for estimation (see column 10, lines 32 - 43 where this is interpreted as equivalent).

With regard to claim 8, Yaknich discloses a method wherein the consecutive m+15 are the last but one m+ 15 symbols, where m is the equalizer window size (see column 10, lines 11 – 31 where this is interpreted as equivalent).

With regard to claim 9, Yaknich discloses method using a Least Square approach for estimating (see column 10, lines 44 – 48).

With regard to claim 11, Yaknich discloses a method for estimating a transmission channel in a digital communications system which operates in accordance with GSM / EDGE specifications (see column 7, lines 32 – 40 of which EDGE is a known derivative), communications system including a receiver (see figure 3, 52) which receives a signal transmitted over transmission channel (see figure 3 ,32), receiver including a channel estimation-based equalizer (see figure 5, 110, 116), equalizer having a window size adapted to the actual delay spread of transmission channel (see column 10, lines 32 – 43), and equalizer using an estimate of transmission channel for synchronizing and correcting received signal , received signal including a 26-bit training sequence (see column 11, line 61 – column 12, line 8), method comprising using m +15 consecutive symbols of said 26-symbol training sequence to estimate without matrix operation (see column 11, line 61 – column 12, line 8), the transmission channel the transmission channel for different channel spans m, where $2 \le m \le 8$ (see column 12, lines 56 – 62 where this is interpreted as inclusive).

With regard to claim 12, Yaknich discloses using step comprises using delayed

segments in training sequence for estimation (see column 10, lines 32 - 43 where this is

interpreted as equivalent).

With regard to claim 13, Yaknich discloses method using a Least Square approach for

estimating (see column 10, lines 44 – 48).

With regard to claim 14, Yaknich discloses an apparatus for estimating a transmission

channel in a digital communications system which operates in accordance with GSM / EDGE

specifications (see column 7, lines 32 – 40 of which EDGE is a known derivative),

communications system including a receiver (see figure 3, 52) which receives a signal

transmitted over transmission channel (see figure 3 ,32), receiver including a channel

estimation-based equalizer (see figure 5, 110, 116), equalizer having a window size adapted

to the actual delay spread of transmission channel (see column 10, lines 32 – 43), and

equalizer using an estimate of transmission channel for synchronizing and correcting

received signal , received signal including a 26-bit training sequence (see column 11, line 61

– column 12, line 8), method comprising using $m + 15$ consecutive symbols of said 26-symbol

training sequence to estimate without matrix operation (see column 11, line 61 – column 12,

line 8), the transmission channel the transmission channel for different channel spans m,

where $2 \leq m \leq 8$ (see column 12, lines 56 – 62 where this is interpreted as inclusive).

With regard to claim 18, Yaknich teaches a method wherein the using step is performed

at different synchronization points (see figure 6 and column 4, lines 46 – 67 where this is

interpreted as equivalent).

With regard to claim 21, Yaknich teaches an apparatus wherein the estimating by

receiver is performed at different synchronization points (see figure 6 and column 4, lines 46

– 67 where this is interpreted as equivalent).

Allowable Subject Matter

Claims 6 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Other Cited Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. NPL references provide discussion of various equalization techniques for GSM. Pukklia (US-6,418,175), Bar-David (US-6,459,728), Piiranen (US-6,631,160), and Chen (US-6,775,521) all disclose variations of channel estimation germane to applicant's claimed invention.
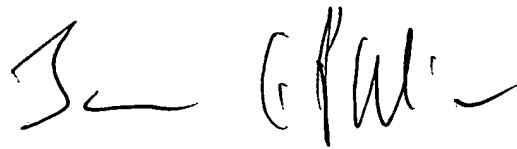
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob Meek whose telephone number is (571)272-3013. The examiner can normally be reached on 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (571)272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

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you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

JMM
9/2/05

JAY K. PATEL
SUPERVISORY PATENT EXAMINER